AUTONOMOUS NAVIGATION SYSTEM FOR PILOTLESS MANOEVRING THROUGH WATERS

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ABSTRACT: For communication distance estimations in Wireless Sensor Networks (WSNs), the RSSI (Received Signal Strength Indicator) value is usually assumed to have a linear always true in reality because there are always uncertainties in RSSI readings due to obstacles, wireless interferences, etc. In this paper, we specifically propose a novel RSSI-based communication distance estimation method based on the idea of interval data clustering. We first use interval data, combined with statistical information of RSSI values, to interpret the distribution characteristics of RSSI. We then use interval data hard clustering and soft clustering to overcome different levels of RSSI uncertainties, respectively. We have used real RSSI measurements to evaluate our communication distance estimation method in three representative wireless environments. Extensive experimental results show that our communication distance estimation method can effectively achieve promising estimation accuracy with high efficiency when compared to other state-of-art approaches.

Keywords: RSSI, Hard cluster, soft clustering, Communication distance estimation method, Wireless sensor network, State of art approaches

INTRODUCTION

Autonomous vehicles are already state-of-the-art in many land based transport modes [1]. To detect the locations and borders, RSSI is highly accurate in vehicles. Here we configured, the border B1 area details are stored in the controlling unit. If a vessel crossed B1, the controlling unit will provide an alert by voice alert via the radio frequency transmitter and vessels will located by soldiers. The usage of vibration sensor is to determine whether the soldier crossed the border limit or not, if he crosses the alarm rang up and IR sensor is used to find he is alive or not when he crossed the border and monitor the heartbeat of the soldier, it is used to detect the soldier status and to rescue him. The accurate location information becomes even more critical in GPS because of some natural disaster [2]. The ultrasonic sensor is used detect the obstacles present in the path of vessel. It is already existing using Bluetooth technology [4].

EXISTING SYSTEM

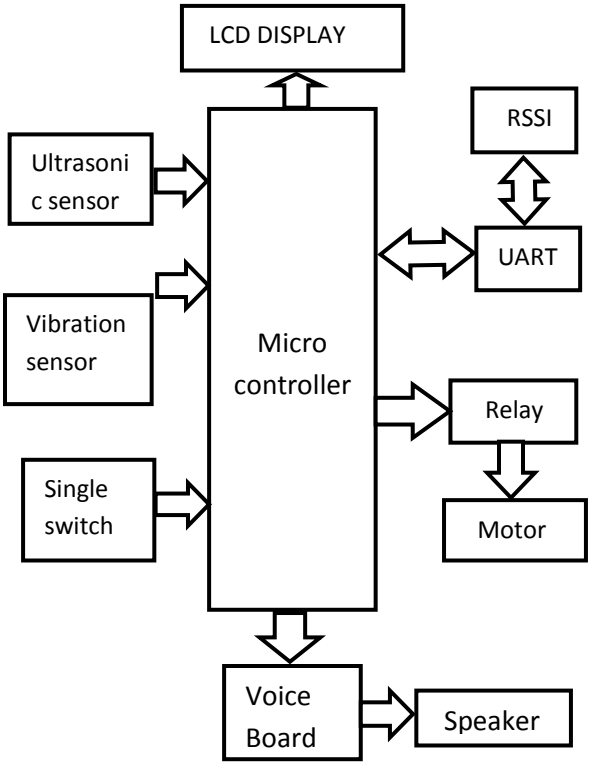
In this Existing System using GPS technology to track and identify the current location of the soldier is presented before border or beyond the border. These systems used electronic map that provides an effective method for navigation and localization detection by the military users. This also acquires increased levels of safety and efficiency for soldiers. The accurate location information becomes even more critical in GPS because of some natural disaster.

DISADVANTAGES OF EXISTING SYSTEM

GPS has a positional error of between 5m & 10m globally. The GPS signal is unable to pass through solid structures so is unable to work indoors, underground, under the water, or under a dense canopy of trees. Can be affected by large buildings and is typically unreliable in CBD (Central Business District) areas. GPS accuracy is related to the quality of signal reception, the larger the antenna the better the signal – so absolute miniaturization is not possible whilst maintaining good positioning accuracy Turn-by-turn directions are not available on every type of GPS device.

BLOCK DIAGRAM OF PROPOSED SYSTEM

VESSEL SECTION:



RECEIVER SECTION:

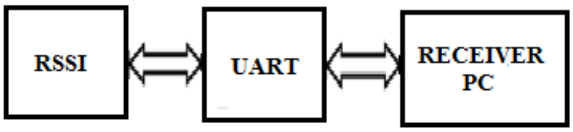


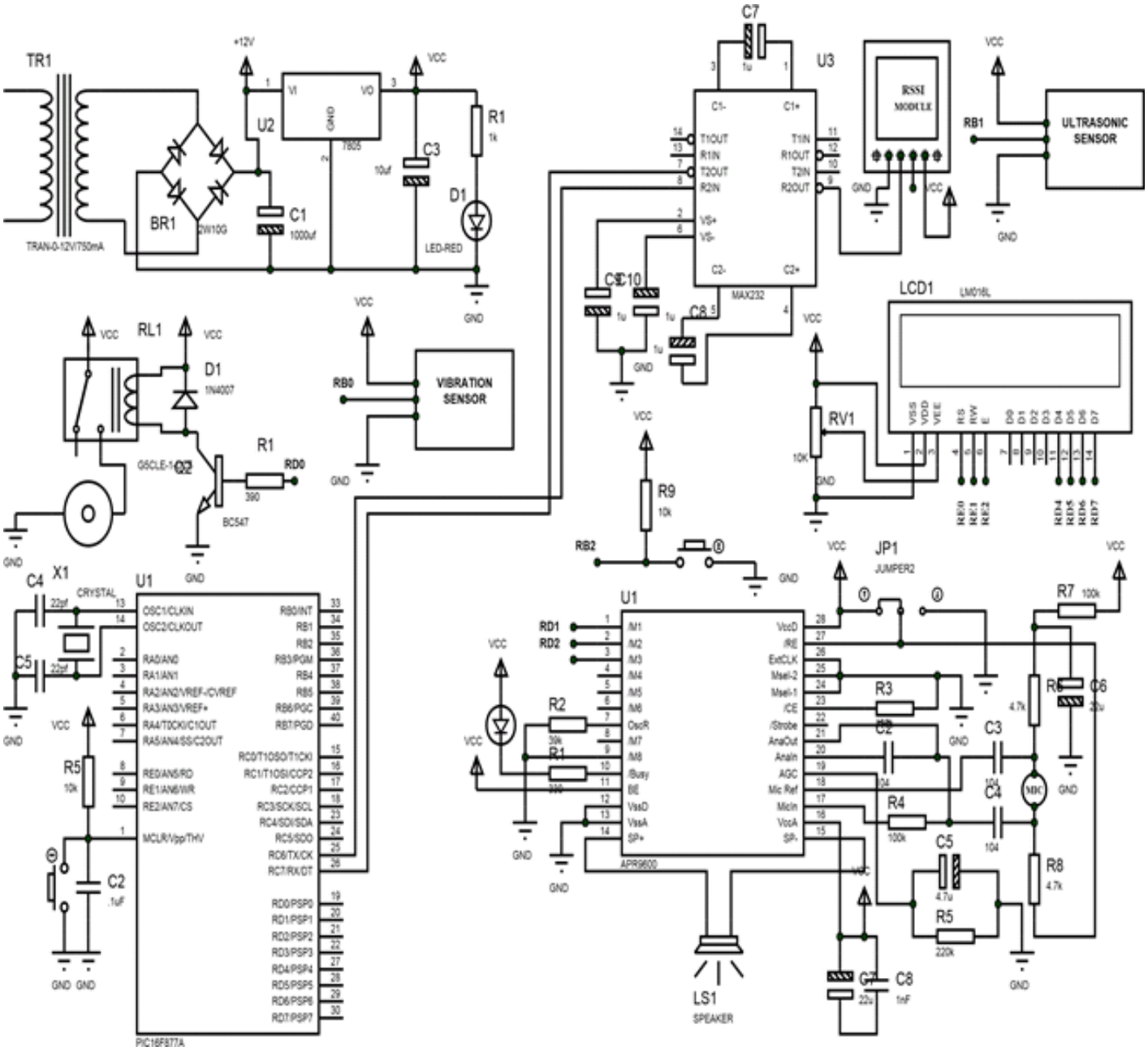
Figure 1: Block Diagram

DESCRIPTION

As given in vessel section of figure 1 diagram the sensing parts sense the vibration and obstacles in the ship and the actuating part is to control the voice board thereby giving voice alert to passengers in the ship. The vessel section RSSI and receiver section RSSI communicates distance with each other. If the vessel crosses the border it can be seen via receiver PC through visual basics algorithm. Now the motor stops and it can be turned on via receiver station or from the ship. The hardware requirements are Micro controller-PIC16F877A, Vibration Sensor, Ultrasonic sensor, Voice board, RSSI transceiver, Relay, Motor, Single switch, LCD and a PC. The Software requirements are Embedded C, Keil Compiler, Visual Basic.

WORKING

In order to detect the locations and borders, RSSI is highly accurate in vehicles. Here we configured, the border B1 area details are stored in the controlling unit. If a vessel crossed B1, the controlling unit will provide an alert by voice alert via the radio frequency transmitter and vessels will located by soldiers. A liquid crystal display (LCD) is also used which is an electro-optical amplitude modulator, realized as a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power. The usage of vibration sensor is to determine whether the soldier crossed the border limit or not, if he crosses the alarm rang up and IR sensor is used to find he is alive or not when he crossed the border and monitor the heartbeat of the soldier, it is used to detect the soldier status and to rescue him. The ultrasonic sensor is used to detect the presence of any obstacle and immediately sends voice alert to the ship. Vibration sensor is used to send voice alert to passengers in ship in case of any ice mountains present in the path of the vehicle. The location of the vehicle is obtained in terms of meters through visual basics algorithm. The monitoring section will control the motion of the ship if it crosses the border. The frequency of the microcontroller is 16 MHZ. Single switch is present in this system is used as emergency button for passengers travelling in ship. The receiver section RSSI communicates with vessel section RSSI for communication distance estimation. The motor can be made off or on by the receiver section or vessel section. In receiver section ship is monitored via PC where the ship area is indicated by the green circle. When the ship moves beyond the estimated border line, initial warning is given. Further penetration of ship into the border causes the motor to be off and the LCD display warning is given. The on and off condition of a motor is given by the on and off indication of a LED in the relay block respectively. The motor can be made into on state again by pressing the reset button of a RSSI module or the on option in receiver PC. The circuit diagram is shown in figure 2.



The power source used in our project is normal domestic supply, but the microcontroller needs only 5v. For that step down transformer (230 to 12 v) is used which is sinusoidal. And a rectifier is used to convert into a pulsed DC of 12v. To make it more unidirectional, we use 1000micro farad. Finally to transform into 5 volt, 7805 voltage regulator is used. The output of this is fed as input to microcontroller.

ADAVANTAGE OF PROPOSED SYSTEM

- Provide continuous position values.
- Power consumption is low
- Low budget and improves security
- Rescue
- Location monitoring for navy and Marian
- Security purpose.

EXPERIMENTAL ANALYSIS

During the ship is in normal operation as shown in figure 3, the motor will be in on state which is indicated by the on state of LED in relay block.

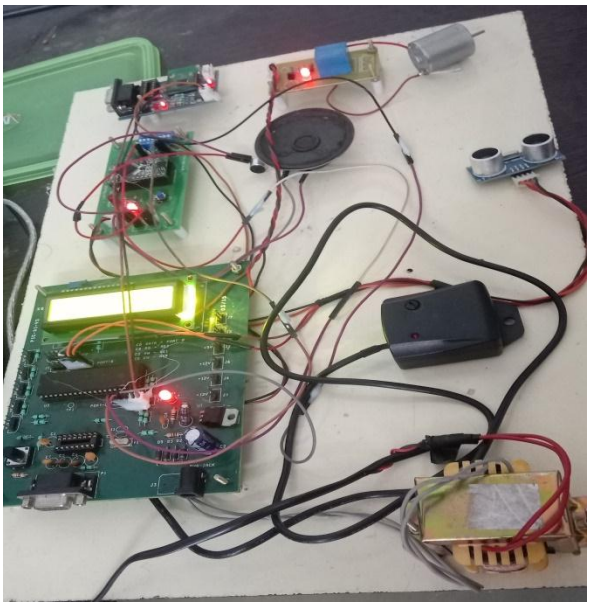


Figure 3: Normal operation

When the ship reaches the restricted zone, the motor will be in off state which is indicated by the off state of LED in relay block.

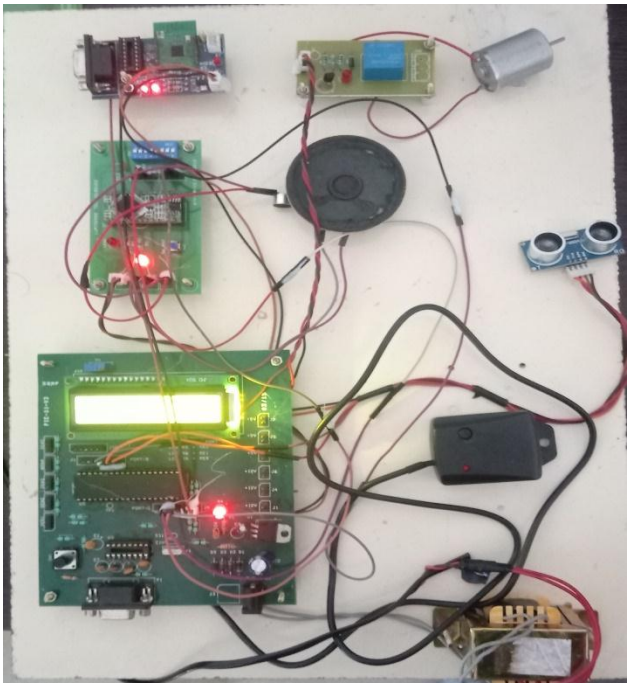


Figure 4: Restricted zone alert

Receiver section:

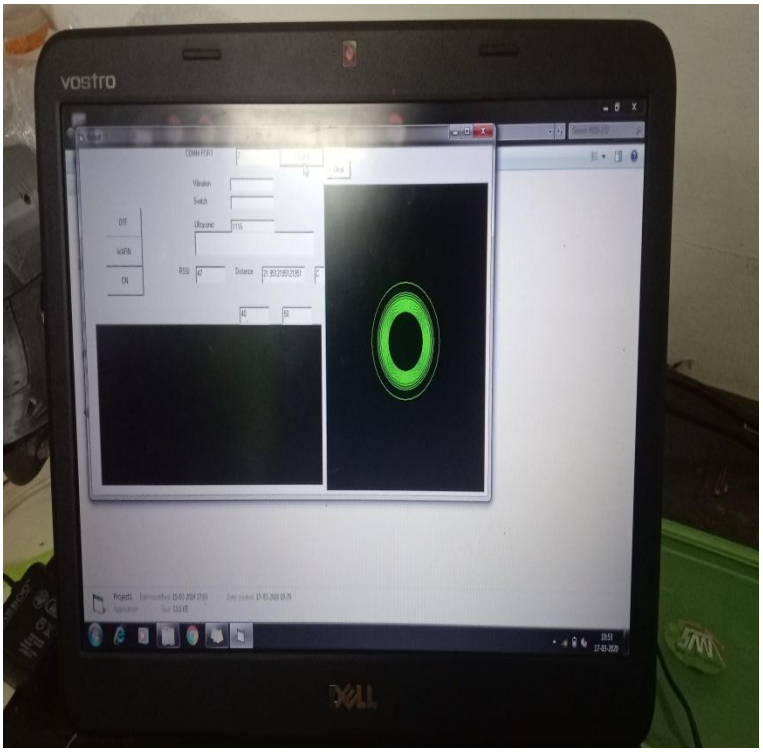


Figure 5: Receiver PC

CONCLUSION AND FUTURE SCOPE

Autonomous Navigation of ships is gaining attention due to inherent difficulties in their manual navigation and control. As 80 per cent of accidents are due to human error, autonomous ships offer safer solutions than crewed ships. Automation has been used for a long time to control the heading of a ship. It is now possible to extend automation to control the navigation of ship even in restricted waters. In addition, looking at the statistics on accidents occurring today, these kind of autonomous navigation systems are important for the safety of all ships. Future work will include large-scale measurements and system evaluation with 200 smart life jacket tags.

LITERATURE REVIEW

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